EXHIBIT 9

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DICTIONARY
of
ELECTRONICS

SEVENTH EDITION

REVISED AND UPDATED

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compensated amplifier — 1. A broadband amplifier whose frequency range is extended by the proper choice of circuit constants. 2. A wideband amplifier made so by the addition of low- and high-frequency compensation.

compensated-impurity resistor — A diffused-layer resistor into which are introduced additional n- and p-type impurities.

compensated-loop direction finder — A direction finder employing a loop antenna and a second antenna system to compensate for polarization error.

compensated semiconductor — A semiconductor in which one type of impurity or imperfection (donor) partially cancels the electrical effects of the other (acceptor).

compensated volume control — *See* loudness control.

compensating filter — A filter used to alter the spectral emission of an emulsion to a specified response to different wavelengths.

compensation — 1. The controlling elements that compensate for, or offset, the undesirable characteristics of the process to be controlled in the system. 2. The shaping of an op-amp frequency response in order to achieve stable operation in a particular circuit. Some op amps are internally compensated, whereas others require some external compensation components in some circuits. 3. The phenomenon whereby extremely small quantities of donor and acceptor impurities present in a semiconductor crystal tend to cancel out each other, so that the material tends to behave according to the dominant impurity only. If both types of impurity are present to an equal extent, the material tends to behave as if it were an intrinsic material.

compensation signal — A signal recorded on a tape, along with the computer data and on the same track as the data; this signal is used during the playback of data to electrically correct for the effects of tape-speed errors.

compensation theorem — An impedance in a network may be replaced by a generator of zero internal impedance, the generated voltage of which at any instant is equal to the instantaneous potential difference produced across the replaced impedance by the current flowing through it.

compensator — 1. In a direction finder, the portion that automatically applies to the direction indication all or part of the correction for the deviation. 2. An electronic circuit for altering the frequency response of an amplifier system to achieve a specified result. This refers to record equalization or loudness correction.

compile — 1. To bring digital-computer programming subroutines together into a main routine or program. 2. To produce a binary coded program in a computer from a program written in source (symbolic) language by selecting appropriate subroutines from a subroutine library as directed by the instructions or other symbols of the source program. The linkage is supplied for combining the subroutines into a workable program, and the subroutines and linkage are translated into binary code.

compiler — 1. An automatic coding system in a computer that generates and assembles a program from instructions written by a programmer. 2. A unit that converts computer programs written in higher-level languages, such as BASIC and C++, into the machine language (object code) of the computer. It is necessary to write an entire program into a compiler's memory before the compiler executes or performs a translation on it. 3. Computer routine that translates symbolic instructions to machine instructions and replaces certain items of input with series of instructions, called subroutines. 4. A high-level, Englishlike programming language that converts instructions into executable machine code. Two examples of such programming languages are COBOL and FORTRAN. 5. A high-level language processor that converts or translates a sequence of source language statements into a corresponding sequence of machine language instructions that may be later loaded into memory and executed by the processor to perform the desired functions. No matter how many times a section of code is used in the assembled program, it will be translated only once and put in its proper place. 6. A program that converts a high-level language into machine language for a specific microprocessor/computer. 7. A program that translates high-level language programs into a series of machine-code instructions for a computer to execute; it may also check the programs' semantic consistency.

compiler language — A computer language system consisting of various subroutines that have been evaluated and compiled into one routine that can be handled by the computer. FORTRAN, COBOL, and ALGOL are compiler languages. Compiler language is the third level of computer language. *See* machine language, 3, for other levels. *See also* high-level language.

compiler program — Software, usually supplied by the manufacturer, to convert an application program from compiler language to machine language.

compiling routine — A routine by means of which a computer can itself construct the program used to solve a problem.

complement — 1. In an electronic computer, a number whose representation is derived from the finite positional notation of another by one of the following rules.

True complement: Subtract each digit from 1 less than the base, then add 1 to the least significant digit and execute all required carries.

Base-minus-1s complement: Subtract each digit from 1 less than the base. (For example, 9s complement in base 10, 1s complement in base 2, etc.)

2. To form the complement of a number. (In many machines, a negative number is represented as a complement of the corresponding positive number.) The binary opposite of a variable or function. The complement of 1 is 0 and the complement of 0 is 1; thus, for example, the complement of 011010 is 100101.

complementary — 1. A term describing integrated circuits that employ components of both polarity types connected in such a way that operation of either is complemented. A complementary bipolar circuit would employ both npn and pnp transistors, and a complementary MOS circuit (CMOS) would employ both n-channel and p-channel devices. In general, complementary devices operate with opposite polarity voltages and currents, which is advantageous in many circuit applications. 2. Two driving-point functions whose sum is a positive constant.

complementary binary or inverted binary — The negative true binary system. It is similar to the binary code except that all binary bits are inverted. Thus, zero scale is all 1s while full scale is all 0s.

complementary circuit — A circuit that provides push-pull operation (sink and source capability) with a single input.

complementary clocks — Two clock signals with opposite phase.

complementary colors — Two colors are complementary if, when added together in proper proportion such as by projection, they produce white light.

complementary constant current logic (C^3L) — A high-density approach to bipolar LSI that has switching speeds of 3 nanoseconds.

coatings, this corresponds to one oxide particle. 2. A region within a ferromagnetic substance where the atomic magnets of many atoms tend to orient themselves parallel to each other; the north poles pointing one way act spontaneously. The domains may be treated as small bar magnets of microscopic dimension. 3. In the Internet and other networks, an extension in a host name that identifies the type of host. The seven domains established by the InterNIC are .arpa (ARPANET), .com (company/commercial), .edu (educational institutions), .gov (government), .mil (military), .net (Internet access providers), and .org (organization). Outside the United States, the domain name is a two-letter country code (for example, .fr for France and .ca for Canada).

domain name — The unique name that identifies an Internet site. Domain names always have two or more parts, separated by dots. The part on the left is the most specific, and the part on the right is the most general. A given machine may have more than one domain name, but a given domain name points to only one machine. Usually, all of the machines on a given network will have the same thing as the right-hand portion of their domain names.

domains — *See* particles.

domestic induction heater — A home cooking utensil that is heated by induced currents within it. The unit contains a primary inductor, with the utensil itself acting as the secondary.

dominant mode — Also called fundamental mode or principal mode. In waveguide transmission, the mode with the lowest cutoff frequency. Designations for this mode are $TE_{0,1}$ and $TE_{1,1}$ for rectangular and circular waveguides, respectively.

dominant wave — The guided wave that has the lowest cutoff frequency. It is the only wave that will carry energy when the excitation frequency is between the lowest and the next higher cutoff.

dominant wavelength — 1. Of a color sample, the wavelength of light that matches it in chromaticity when mixed with white light. 2. The wavelength that is a quantitative measure of the apparent color of light as perceived by the human eye.

dominant wavelength of a color — The predominant wavelength of light in a color.

donor — Also called donor impurity. 1. An impurity atom that tends to give up an electron and thereby affects the electrical conductivity of a crystal. Used to produce n-type semiconductors. 2. A chemical that adds electrons to crystal lattices. 3. An impurity from column V of the periodic table, which adds a mobile electron to the conduction band of silicon, thereby making it more n-type. Commonly used donors are arsenic and phosphorous (compare with *acceptor*).

donor impurity — An element or compound whose atoms or molecules have more valence electrons than those of the intrinsic semiconductor material into which they are introduced in small quantities as an impurity or dopant. Because the donor impurity possesses more valence electrons, the material doped with a donor impurity is an n-type semiconductor. *See* donor.

donor-type semiconductor — An n-type semiconductor.

donut — *See* land, 2.

door cord — A short, insulated cable with an attaching block and terminals at each end used to conduct current to a device, such as foil, mounted on the movable portion of a door or window.

doorknob tube — A vacuum tube so called because of its shape designed for UHF transmitter circuits. It has a low electron-transit time and low interelectrode capacitance because of the close spacing and small size, respectively, of its electrodes.

door trip switch — A mechanical switch mounted so that movement of a door will operate the switch.

dopant — 1. An impurity added to a semiconductor to improve its electrical conductivity; any material added to a substance to produce desired properties in the substance. 2. Selected impurity introduced into semiconductor substrates in controlled amounts, the atoms of which form negative (n-type) and positive (p-type) conductive regions. Phosphorus, arsenic, and antimony are n-type dopants for silicon; boron, aluminum, gallium, and indium are p-type dopants for silicon.

dope — To add impurities (called dopants) to a substance, usually a solid, in a controlled manner to cause the substance to have certain desired properties. For example, the number of electrical carriers in silicon can be increased by doping it with small amounts of other semimetallic elements. Ruby is aluminum oxide doped with chromium oxide.

doped junction — A semiconductor junction produced by the addition of an impurity to the melt during crystal growth.

doped region — A layer of an integrated circuit in which impurities have been introduced.

doped solder — Solder to which an element not normally found in solder has been intentionally added.

doping — The addition of controlled amounts of impurities to a semiconductor to achieve a desired characteristic, such as to produce an n-type or p-type material, accomplished through thermal diffusion or ion implantation. Common doping agents for germanium and silicon include aluminum, antimony, arsenic, gallium, and indium.

doping agent — An impurity element added to semiconductor materials used in crystal diodes and transistors. Common doping agents for germanium and silicon include aluminum, antimony, arsenic, gallium, and indium.

doping compensation — The addition of donor impurities to a p-type semiconductor or of acceptor impurities to an n-type semiconductor.

Doppler cabinet — A speaker cabinet in which either the speaker or a baffle board is rotated or moved to change the length of the sound path cyclically and thereby produce a vibrato effect mechanically.

Doppler effect — 1. The observed change of frequency of a wave caused by a time rate of change of the effective distance traveled by the wave between the source and the point of observation. As the distance between a source of constant vibration and an observer diminishes or increases, the received frequencies are greater or less. 2. The apparent change in the frequency of radio wave reaching an observer, due either to motion of the source toward or away from the observer, to motion of the observer, or both. 3. The apparent change in frequency of sound or radio waves when reflected from or originating from a moving object. Utilized in some types of motion sensors. 4. The radiation emitted from a source that moves away from an observer appears to be of lower frequency than the radiation emitted from a stationary source. The radiation emitted from a source moving toward the observer appears to be of a higher frequency than that from a stationary source.

Doppler principle — The theory established by Doppler in 1842 that states that the rate of change in distance between a perceiver and a radiation source determines the change in frequencies.

Doppler radar — A radar unit that measures the velocity of a moving object by the shift in carrier